

VÍCTOR BUCAREY LÓPEZ

Universidad de O'Higgins, Institute of Engineering Sciences, Rancagua, Chile.

victor.bucarey@uoh.cl, ORCID: 0000-0002-3043-8404

RESEARCH INTERESTS

Bilevel Optimization, Data-driven optimization, Game Theory.

EDUCATION AND DEGREES

Universidad de Chile, Santiago, Chile 2013- 2017

- Ph.D. in Engineering Systems.
- Dissertation title: *Addressing Problem Size in Stackelberg Security Games.*

Universidad de Chile, Santiago, Chile 2011-2013

- M.Sc. in Operations Research.

Universidad de Chile, Santiago, Chile 2006-2011

- Industrial Engineer Degree.

WORK EXPERIENCE

Institute of Engineering Sciences, Universidad de O'Higgins, Rancagua, Chile
Assistant Professor *August 2021 - Present*

Institute of Complex Systems of Engineering Santiago, Chile
Researcher *November 2023 - July 2025*

Data Lab Analytics, Vrije Universiteit Brussel, Brussels, Belgium
Senior Researcher *July 2020 - July 2021*

- **Interfaces between Machine Learning and Combinatorial Optimization:** Learning for hard combinatorial optimization problems and efficient algorithms to solve difficult prediction + optimization problems

Université Libre de Bruxelles, Brussels, Belgium
Postdoctoral Fellow *June 2018 - June 2020*

- **Algorithms and Modelling in Bi-level Optimization:** Design and comparison of different algorithms and approximations to solve bi-level optimization problems with applications in pricing, security and network design.

Universidad de Chile, Santiago, Chile
Research Assistant *March 2012- May -2018*

- **Stochastic Stackelberg Security Games:** Design and comparison of different algorithms and approximations to solve Stochastic Stackelberg Security Games.
- **Models and Algorithms for the Police Districting Problem:** Mixed Integer linear models to solve the districting problem in the police context, including shape considerations and balance in the workload.

University of Southern California, Los Angeles, CA
Research Internship *October 2015- January 2016*

- **Abstractions to Solve Opportunistic Crime Security Games at Scale.:** Design of a Multi-layer algorithms to solve large games where the strategies are learned by the defender.

Institute Complex Engineering System, ISCI, Chile
Scientific Consultant *2010-May 2018*

- Scientific consultant in a outreach and education program *Comunidad InGenio*. The activities performed were the development of different educative resources aimed at high school students to teach math and also show the research of the institute. (<http://www.comunidatingenio.cl>)

PUBLICATIONS

Journal articles and Book chapters

1. Bustamante, P., **Bucarey, V.**, Labbe, M., Marianov, V., & Ordoñez, F. Novel valid inequalities and branch-and-price for Stackelberg Security Games. *Computers and Operations Research* (2025). <https://doi.org/10.1016/j.cor.2025.107122>
2. **Bucarey, V.**, González-Blanco, N., Labbé, M. & Mesa, J. A. . On λ -cent-dians and generalized-center for network design: formulations and algorithms. Accepted in *Annals of Operations Research* (2025).
3. **Bucarey, V.**, González-Blanco, N., Labbé, M. & Mesa, J. A. . On λ -cent-dians and generalized-center for network design: definitions and properties. *Annals of Operations Research* (2025). <https://doi.org/10.1007/s10479-025-06536-5>
4. Mandi, J., Kotary, J., Berden, S., Mulamba, M., **Bucarey, V.**, Guns, T., & Fioretto, F. (2024). Decision-focused learning: Foundations, state of the art, benchmark and future opportunities. *Journal of Artificial Intelligence Research*, 80, 1623-1701
5. Bustamante, P., **Bucarey, V.**, Labbe, M., Marianov, V., & Ordoñez, F (2024) Playing Stackelberg Security Games in Perfect Formulations. *Omega* DOI: 10.1016/j.omega.2024.103068
6. Canoy, R., **Bucarey, V.**, Mandi, J., Mulamba, M., Molenbruch, Y. & Guns, T. (2024). Probability estimation and structured output prediction for learning preferences in last mile delivery. *Computers & Industrial Engineering*, 109932. (preprint at <https://arxiv.org/abs/2201.10269>)
7. Canoy, R., **Bucarey, V.**, Mandi, J., & Guns, T. (2023). Learn and route: learning implicit preferences for vehicle routing. *Constraints* 28, 363–396 (2023). <https://doi.org/10.1007/s10601-023-09363-2>
8. **Bucarey, V.**, Della Vecchia, E., Jean-Marie, A., Ordoñez, F. (2022). Stationary Strong Stackelberg Equilibrium in Discounted Games. *IEEE Transaction on Automatic Control*. DOI: 10.1109/TAC.2022.3220512
9. Jean-Marie, A., Tidball, M., & **Bucarey, V.** (2021). The Stackelberg games of water extraction with myopic agents. *International Game Theory Review*, <https://doi.org/10.1142/S0219198921500237>.
10. **Bucarey, V.**, Casorrán, C., Labbé, M., Ordoñez, F., & Figueroa, O. (2021). Coordinating resources in stackelberg security games. *European Journal of Operational Research*, 291(3), 846-861.
11. **Bucarey, V.**, Labbé, M., Morales, Juan M., & Pineda, S. (2021) An exact dynamic programming approach to segmented isotonic regression. *Omega*, doi:<https://doi.org/10.1016/j.omega.2021.102516>
12. **Bucarey, V.**, Fortz, B., González-Blanco, N., Labbé, M., & Mesa, J. A. (2021). Benders decomposition for Network Design Covering Problems. *Computers & Operations Research*. <https://doi.org/10.1016/j.cor.2021.105417>
13. **Bucarey, V.**, Elloumi, S., Labbé, M., Plein, F. (2020). Models and Algorithms for the Product Pricing with Single-Minded Customers Requesting Bundles. *Computers & Operations Research*. <https://doi.org/10.1016/j.cor.2020.105139>
14. **Bucarey, V.**, Ordoñez, F., & Bassaletti, E. (2015). Shape and Balance in Police Districting. In *Applications of Location Analysis* (pp. 329-347). Springer International Publishing.

Peer-reviewed proceedings

1. **Bucarey, V.**, Calderón, S., Muñoz, G., & Semet, F. (2024). Decision-focused predictions via pessimistic bilevel optimization: a computational study. *CPAIOR 2024*
2. Castillo, P., **Bucarey, V.**, Davila, S. & Quezada, F. (2024). Balancing Resources and Demand: A Bi-Objective Mixed-Integer Programming Approach of Healthcare Districts in Chile. In *Proceedings of the 13th International Conference on Operations Research and Enterprise Systems - ICORES*; pages 341-349. DOI: 10.5220/0012410100003639
3. Mandi, J., **Bucarey, V.**, Tchomba, M. M. K., & Guns, T. (2022). Decision-Focused Learning: Through the Lens of Learning to Rank. *Proceedings of the 39th International Conference on Machine Learning*, PMLR 162:14935-14947, 2022
4. Mandi, J., Canoy, R., **Bucarey, V.** & Guns, T. (2021). Data Driven VRP: A Neural Network Model to learn hidden preferences for VRP. *27th International Conference on Principles and Practice of Constraint Programming*

5. Mulamba, M., Mandi, J., Diligenti, M., Lombardi, M., **Bucarey, V.** & Guns, T. (2021). Contrastive losses and solution caching for predict-and-optimize In 30th International Joint Conference on Artificial Intelligence (IJCAI-21): IJCAI-21 (pp. 2833-2840)
6. **Bucarey, V.**, & Labbé, M. (2019). Discussion of Fairness and Implementability in Stackelberg Security Games. Decision and Game Theory for Security: 10th International Conference, GameSec 2019.
7. **Bucarey, V.**, Casorran C, Figueroa O, Rosas K, Navarrete H, Ordoñez F (2017) Building real stackelberg security games for border patrols. Decision and Game Theory for Security: 8th International Conference, GameSec 2017.
8. Zhang, C., **Bucarey, V.** Mukhopadhyay, A., Sinha, A., Qian, Y., Vorobeychik, Y., & Tambe, M. (2016). Using Abstractions to Solve Opportunistic Crime Security Games at Scale. In Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2016).

Published preprints

1. **Bucarey, V.**, Calderón, S., Muñoz, G., & Semet, F. (2024). Decision-focused predictions via pessimistic bilevel optimization: complexity and algorithms.
2. Olivares, Marcelo, Yung, Daniel & **Bucarey, V.** Labor Planning and Shift Scheduling in Retail Stores Using Customer Traffic Data (September 18, 2020). Available at SSRN: (PDF)
3. **Bucarey, V.**, Della Vecchia, E., Jean-Marie, A., & Ordóñez, F. (2019). Stationary Strong Stackelberg Equilibrium in Discounted Stochastic Games.

AWARDED PROJECTS

Projects as PI

- Data-driven decision-making in Location and Transportation. Joint project with INRIA-Lille and USACH. ECOS-Anid. ECOS230033. 2024 - 2026. France-Chile.
- MICCHI: Mecanismos en Inventivos Contra la Crisis Hídrica. Concurso de Fomento a la Vinculación Internacional para Instituciones de Investigación Convocatoria 2023. FOVI230180 Anid-Chile.
- Decision-focused learning under the lens of mathematical programming, FONDECYT de Iniciación n°11220864, 2022-2025, ANID-Chile.
- CNRS, Appel unique mobilité entrante 2022. In collaboration with Renaud Chicoisne, ISIMA-LIMOS-Clermont Auvergne INP, Clermont-Ferrand, France. (3.500 euros)

Others

- BILENS: Bilevel optimization for Logistics, Energy and Security problems. ASSOCIATIVE TEAM. INRIA. France - Chile. 2025 - 2027. **Associate Researcher**
- Herramientas de machine learning y optimización para mejora de calidad de soluciones de ruteo de vehículos y última milla. Idea I+D 2025. ID25I10198. **Associate researcher**.
- A New Probabilistic Paradigm for Modelling Optimal Decision-Making Processes Under Uncertainty. PROYECTOS DE EXPLORACIÓN 2022 - ANID - Chile, 2022 - 2025. **Associate Researcher**
- BIOSEL: Bilevel Optimization in Security, Energy and Logistics. ASSOCIATIVE TEAM. INRIA. France - Chile. 2020 - 2024. **Associate Researcher**
- BIPLOS: Bilevel Problems in LOGistics and Security. ASSOCIATIVE TEAM. INRIA. France - Chile. 2017 - 2020. **Postdoctoral Researcher**
- Desarrollo de una Plataforma Software-as-a-Service para Apoyar Decisiones de Dotación de Personal en Cadenas de Retail. FONDEF n°: IT17I0066, 2018-2020. Conicyt- Chile **Postdoctoral researcher**.
- DyGaMe: Dynamic Games Methods. Stic-AmSud, 2016-2017. Conicyt- Chile **PhD Student**.

TEACHING

Student supervision: 3 master theses and 8 undergrads at the Engineering school at Universidad de O'Higgins, Chile.

Lecturer, Universidad de O'Higgins, School of Engineering

- *Data project 1 & 2* Fall 2023, Spring 2023, Fall 2024.
- *Evidence-based management.* Fall 2022.
- *Logistics, manufacturing and services.* Fall 2022,2023,2024,2025.
- Advanced Modelling for OR, Fall 2023 and 2025.

Instructor, Universidad de Chile, Department of Industrial Engineering

Undergrad

- *Modeling and Optimization.* Fall 2013, Fall 2014, Fall 2016, Fall 2018.
- *Operations Management I.* Spring 2013, Fall 2015, Fall 2017.

Teaching assistant, Universidad de Chile, Department of Industrial Engineering M.Sc. Public Policy: *Economy and Public Policy.* Under Pablo Gonzalez and Cristina Holuigue. Spring 2011, Spring 2012. **M. Sc. Operations Research:** *Operations Management in the Service Industry.* Under Richard Weber, Ricardo Montoya. Spring 2011. **Undergrad:** *Marketing II, Operations Management II, Economy, Modeling and Optimization.*

INDUSTRY COLLABORATIONS

1. **Intra-mine Concrete Vehicle Scheduling** Client: Xtreme Mining. **Lead Consultant.** August 2024 - April 2025
2. **Non-Technical Losses for the VAD Process 2024–2028** Client: Electric Distribution Companies of Chile. **Deputy Project Director.** March–December 2024.
3. **Peak Predictions of Energy Demand Deputy Project Director.** March 2024– April 2025.

ACADEMIC SERVICE

- MIP Workshop South America 2025: Local organizer and Committee member. <https://www.mixedinteger.org/MIPSouthAmerica/2025/>.
- Webmaster of the Bilevel Optimization Society (2025-2026)
- Founding committee member of the Bilevel Optimization Society, a branch of the Mathematical Optimization Society (MOS). 2023-2025.
- Chair IWOBIP: International Workshop on Bilevel Programming, Rancagua - Santa Cruz 2024. <https://iwobip2024.c>

SELECTED TALKS

1. *Decision-focused learning through the lens of bilevel optimization.* International Conference on bilevel optimization, University of Southampton 2023; ISMP 2024, Montreal.
2. *A comparison of decision-focused learning and risk-averse optimization.* IFORS, Santiago, Chile 2023.
3. *End-to-end decision-focussed learning over combinatorial problems.* YOUNG Online Seminar Series “Machine Learning NeEDS Mathematical Optimization” May 17th, 2021.
4. *Stationary Stochastic Strong Stackelberg Equilibrium.* June 19th, 2018, IWOBIP conference, Lille, France.
5. *Coordinating Resources: Matching Formulations for SSGs Applied to Border Patrolling.* January 15th, 2016. Teamcore at USC. October 22nd, 2017. Informs annual meeting, Houston, USA.
6. *A Mixed Integer Programming Approach for the Police Districting Problem.* May 25th, 2014, SIAM Conference on Optimization, San Diego, USA. October 23rd, 2013, X Optima, Concepción, Chile.
7. *How to teach crime analytics* July 17th, 2014. IFORS Barcelona, Spain.

RECOGNITIONS

- Informs Journal on Computing - Meritorius reviewer 2024.
- Best Part-time Professor. Department of Industrial Engineering, University of Chile, years 2013, 2014, 2016
- Best Teaching assistant. Department of Industrial Engineering, University of Chile, years 2011, 2012
- Dean's List. University of Chile, Engineering School, 2007, 2008, 2009

COMPUTATIONAL SKILLS

Daily usage of Python, AMPL, CPLEX, Gurobi, OR-Tools, KNITRO, LaTeX, R, Ms Excel.
Bases of QGis, MatLab, ZIMPL, Java, mySQL.

LANGUAGES

Native Spanish speaker, fluent in English. French (B1).

HOBBIES

I play bass guitar and keyboard as an amateur. I also enjoy practicing and watching soccer.

REFERENCES

1. Fernando Ordóñez, Full Professor, Departamento de Ingeniería Industrial, Universidad de Chile.
Mail: fordon@dii.uchile.cl
2. Martine Labbé, Full professor, Computer Science Department, Université Libre de Bruxelles.
Mail: martine.labbe@ulb.be